

**TURKISH  
AVIATION  
ACADEMY**



**İTÜ**



## *Airline Operating Costs*

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*Network, Fleet and Schedule*  
*Strategic Planning*  
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# *Lecture Outline*

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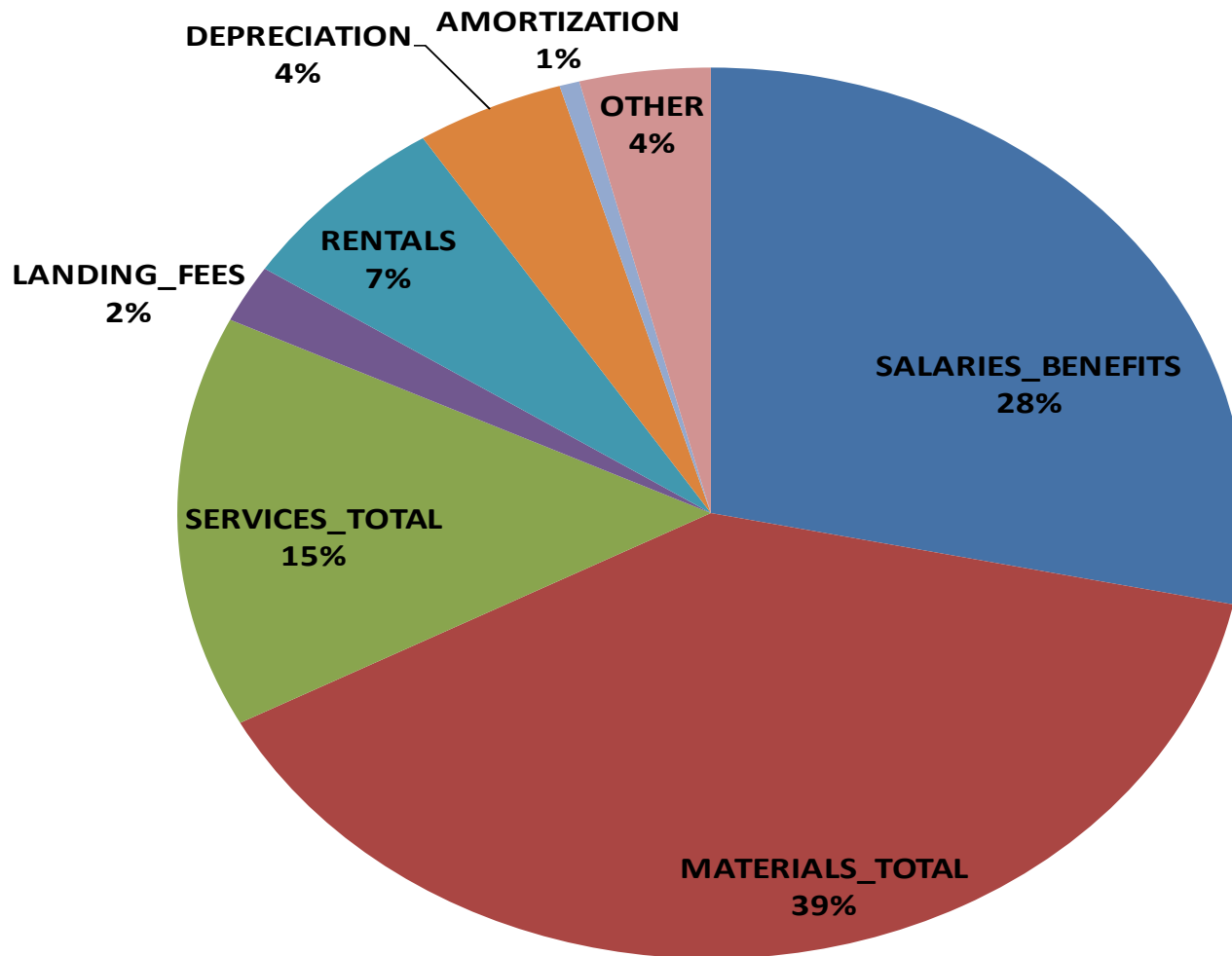
- **Cost Categorization Schemes**
  - Administrative cost allocation
  - Functional cost categories and typical breakdown
  - Cost trends by category
- **Flight Operating Costs**
  - Comparisons across aircraft types
- **Total costs vs. unit costs**
  - Comparisons across airlines
  - Impacts of stage length on unit costs
- **Unit Cost Trends**
  - Fuel, labor and non-labor unit costs

## ***US DOT Form 41 Database***

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- **Form 41 contains traffic, financial, and operating cost data reported to the DOT by US Major airlines**
  - Data is reported and published quarterly for most tables
  - Detail of reporting differs for different expense categories
    - Aircraft operating expenses by aircraft type and region of operation
    - Other expenses more difficult to allocate by aircraft type
- **Cost categorization schemes differ, but all are affected by accounting and allocation assumptions**
  - Administrative cost categories – financial reports
  - Functional cost categories – airline cost and productivity comparisons

# Administrative Cost Breakdown US Airlines 2012



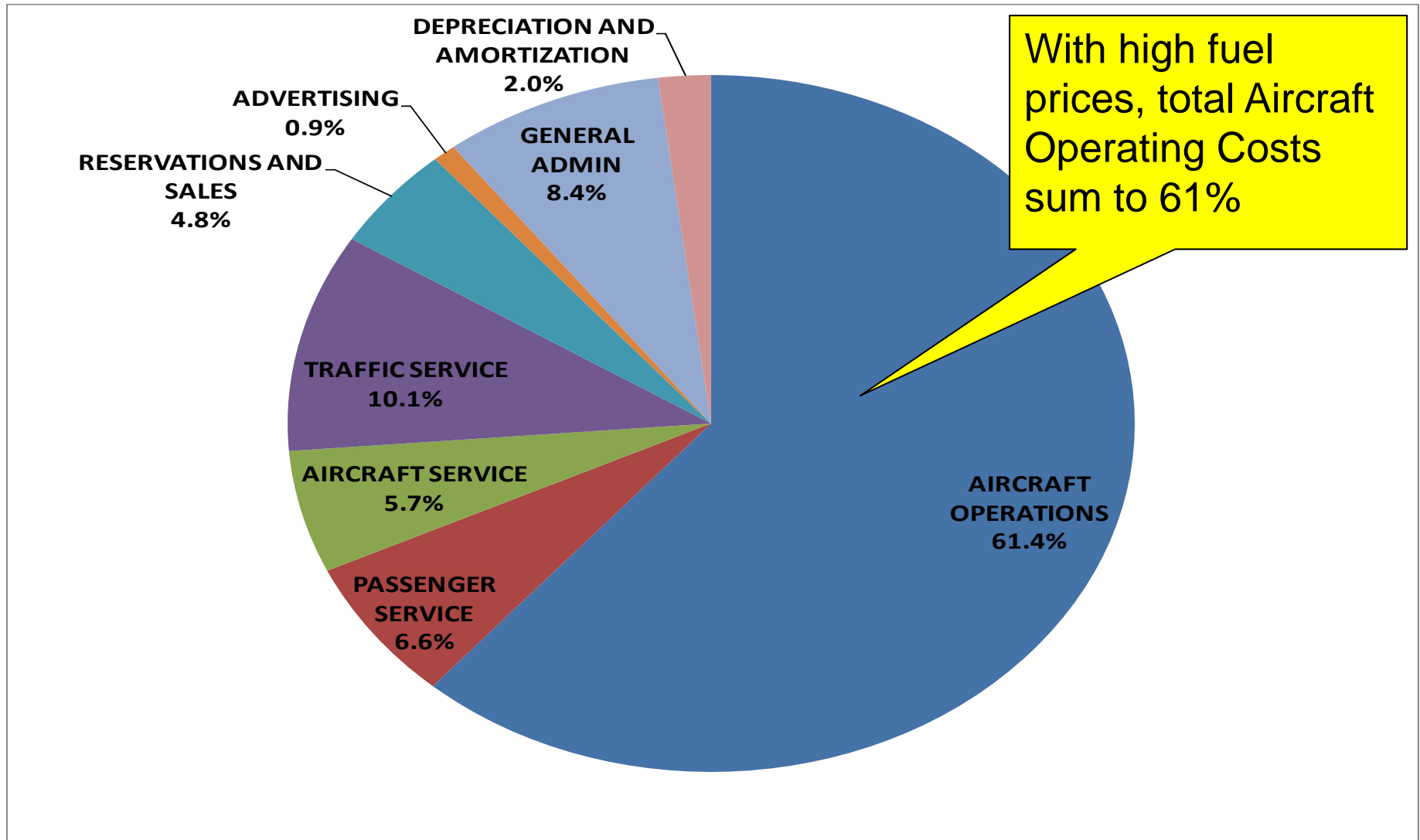
Source: US DOT Form 41 Financial Reports

## ***Functional Cost Categories***

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- **Aircraft operating costs**
  - Expenses associated with flying aircraft, also referred to as “Direct Operating Costs” (DOC)
- **Aircraft servicing costs**
  - Handling aircraft on the ground, includes landing fees
- **Traffic service costs**
  - Processing passengers, baggage and cargo at airports
- **Passenger service costs**
  - Meals, flight attendants, in-flight services
- **Promotion and Sales costs**
  - Airline reservations and ticket offices, travel agency commissions
- **Other costs, including:**
  - General and administrative expense
  - Depreciation and amortization

# Functional Cost Breakdown US Airlines 2012



Source: US DOT Form 41 Financial Reports

## *Activity Drivers by Functional Category*

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- **Aircraft Operating Costs**
  - Per Block Hour (for example, \$4400 for 150-seat A320 in 2011)
- **Aircraft Servicing Costs**
  - Per Aircraft Departure (average \$1200)
- **Traffic Servicing Costs**
  - Per Enplaned Passenger (average \$15)
- **Passenger Servicing Costs**
  - Per RPM (average \$0.015)
- **Reservations and Sales Costs**
  - % of Total Revenue (average 9%)
- **Other Indirect and System Overhead Costs**
  - % of Total Operating Expense (average 10%)

***“Back of the Envelope” Break Even Fare  
Boston-Orlando A320 Flight 80% LF***

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<b>AOC 3.0 block hours @ \$4400</b>	<b>\$ 13200</b>
<b>Aircraft Servicing (1 departure @ \$1200)</b>	<b>\$ 1200</b>
<b>Traffic Servicing (120 pax @ \$15)</b>	<b>\$ 1800</b>
<b>Pax Servicing (132000 RPM @ \$0.015)</b>	<b>\$ 1980</b>
<b>System Overhead Costs (10% of sub-total)</b>	<b>\$ 2020</b>
<b>Sub-total</b>	<b>\$ 20200</b>
<b>Break Even Net Revenue per Pax (120)</b>	<b>\$ 168</b>
<b>Distribution and Sales Costs (9% of fare)</b>	<b>\$ 17</b>
<b>Break Even Average Fare</b>	<b>\$ 185</b>



## ***Airline Operating Cost Breakdown***

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- **Adapted from Form 41, used by Boeing, MIT (and Aviation Daily) for more detailed comparisons**

FLIGHT (DIRECT) OPERATING COSTS (DOC) = 50%

- All costs related to aircraft flying operations
- Include pilots, fuel, maintenance, and aircraft ownership

GROUND OPERATING COSTS = 30%

- Servicing of passengers and aircraft at airport stations
- Includes aircraft landing fees and reservations/sales charges

SYSTEM OPERATING COSTS = 20%

- Marketing, administrative and general overhead items
- Includes in-flight services and ground equipment ownership

- **Percentages shown reflect historical “rules of thumb”.**

## ***World Airline Operating Cost Breakdown***

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<b>ICAO OPERATING COST CATEGORIES</b>	<b>1992</b>	<b>2002</b>	<b>2005</b>
<b>Direct Aircraft Operating Costs</b>	<b>44.0</b>	<b>49.1</b>	<b>54.0</b>
Flight Operations (Total)	<u>26.1</u>	<u>30.7</u>	<u>37.7</u>
Flight Crew	7.2	9.0	7.8
Fuel and Oil	12.2	13.0	21.9
Other	6.7	8.7	8.0
Maintenance and Overhaul	10.9	11.3	10.2
Depreciation and Amortization	7.0	7.1	6.1
<b>Indirect Operating Costs</b>	<b>56.0</b>	<b>50.9</b>	<b>46.0</b>
User charges and station expenses (Total)	<u>17.2</u>	<u>17.0</u>	<u>16.2</u>
Landing and associated airport charges	3.9	4.0	3.8
Other	13.3	13.0	12.4
Passenger services	10.8	10.3	9.3
Ticketing, sales and promotion	16.4	10.7	9.1
General, administrative and other	11.6	12.9	11.4

Source: ICAO, Belobaba et al (2009)

## ***Operating Cost Breakdown by Region***

	North America		Europe		Asia Pacific		All Major Airlines	
	2001	2008	2001	2008	2001	2008	2001	2008
Labour	36.2%	21.5%	27.2%	24.8%	17.2%	14.7%	28.3%	20.1%
Fuel	13.4%	34.2%	12.2%	25.3%	15.7%	36.7%	13.6%	32.3%
Aircraft Rentals	5.5%	3.0%	2.9%	2.5%	6.3%	4.5%	5.0%	3.5%
Depreciation and Amortisation	6.0%	4.5%	7.1%	5.7%	7.4%	7.8%	6.7%	5.9%
Other	38.9%	36.9%	50.7%	41.8%	53.4%	36.3%	46.4%	38.2%

Source: Company Reports

- ***Fuel component has increased for all regions, while labor percentages have declined.***
- ***Labor share dropped the most for North America airlines.***

Source: IATA

## ***Flight Operating Costs***

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- **Flight operating costs (FOC) by aircraft type:**
  - Reflect an average allocation of system-wide costs per block hour, as reported by airlines for each aircraft type
  - Can be affected by specific airline network or operational patterns
  - Collected by US DOT as Form 41 operating data from airlines
- **Typical breakdown of FOC for US carrier:**
  - CREW: Pilot wages and benefits
  - FUEL: Easiest to allocate and most clearly variable cost
  - MAINTENANCE: Direct airframe and engine maintenance cost, plus “burden” or overhead (hangars and spare parts inventory)
  - OWNERSHIP: Depreciation, leasing costs and insurance

## ***US Airlines: Airbus 320 (avg. 150 seats)***

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- **Costs per block-hour**

	<u>2005</u>	<u>2007</u>	<u>2012</u>
CREW	\$ 470	\$ 454	\$ 562
FUEL	\$1327	\$1713	\$2578
MAINTENANCE	\$ 524	\$ 576	\$ 774
OWNERSHIP	<u>\$ 570</u>	<u>\$ 570</u>	<u>\$ 653</u>
TOTAL FOC	\$2891	\$3313	\$4567
- **Based on reported average stage length and block-hr daily utilization (weighted averages):**
  - Different stage lengths and utilization by different airlines result in substantial variations in block-hour costs for same aircraft type
  - Also, differences in crew (union contracts, seniority), maintenance (wage rates), and ownership costs (age of a/c)

## ***Comparing FOC Across Aircraft Types***

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- **All else equal, larger aircraft should have higher flight operating cost per hour, lower unit cost per ASM:**
  - There exist some clear economies of aircraft size (e.g., two pilots for 100 and 400 seat aircraft, although paid at different rates)
  - Also economies of stage length, as fixed costs of taxi, take-off and landing are spread over longer flight distance
- **But, many other factors distort cost comparisons:**
  - Pilots paid more for larger aircraft that fly international routes
  - Newer technology engines are more efficient, even on small planes
  - Reported depreciation costs are subject to accounting procedures
  - Aircraft utilization rates affect allocation of costs per block-hour

## ***FOC Selected Aircraft Types 2012***

<b>Aircraft Type</b>	<b>Average Seats</b>	<b>FOC/ Block-hr</b>	<b>FOC/ Seat-hr</b>	<b>Average Stage (mi.)</b>	<b>Utilization (block-hrs/day)</b>
<b>E190</b>	<b>100</b>	<b>\$3,152</b>	<b>\$31.52</b>	<b>610</b>	<b>9.9</b>
<b>A319</b>	<b>128</b>	<b>\$4,099</b>	<b>\$32.02</b>	<b>850</b>	<b>10.6</b>
<b>737-800</b>	<b>158</b>	<b>\$4,662</b>	<b>\$29.50</b>	<b>1263</b>	<b>10.4</b>
<b>757-200</b>	<b>179</b>	<b>\$5,939</b>	<b>\$33.18</b>	<b>1472</b>	<b>9.9</b>
<b>A330-200</b>	<b>268</b>	<b>\$8,882</b>	<b>\$33.14</b>	<b>3812</b>	<b>14.7</b>
<b>747-400</b>	<b>380</b>	<b>\$14,257</b>	<b>\$37.52</b>	<b>4979</b>	<b>11.7</b>

## ***Total Operating Costs vs. Unit Costs***

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- **Total operating costs increase with size of airline, aircraft size and stage length**
  - Increased output (ASMs) leads to higher total operating costs
  - Bigger aircraft cost more to operate (per block hour, per flight)
  - Longer stage length means more fuel burned, more pilot and flight attendant hours
- **But, due to high fixed costs, airlines should have economies of scale in unit costs (in theory):**
  - Larger aircraft should have lower operating costs per seat and per seat-mile (ASM)
  - Longer stage lengths should lead to lower unit costs
- **Larger airlines with bigger aircraft flying longer stage lengths should have lowest unit costs.**

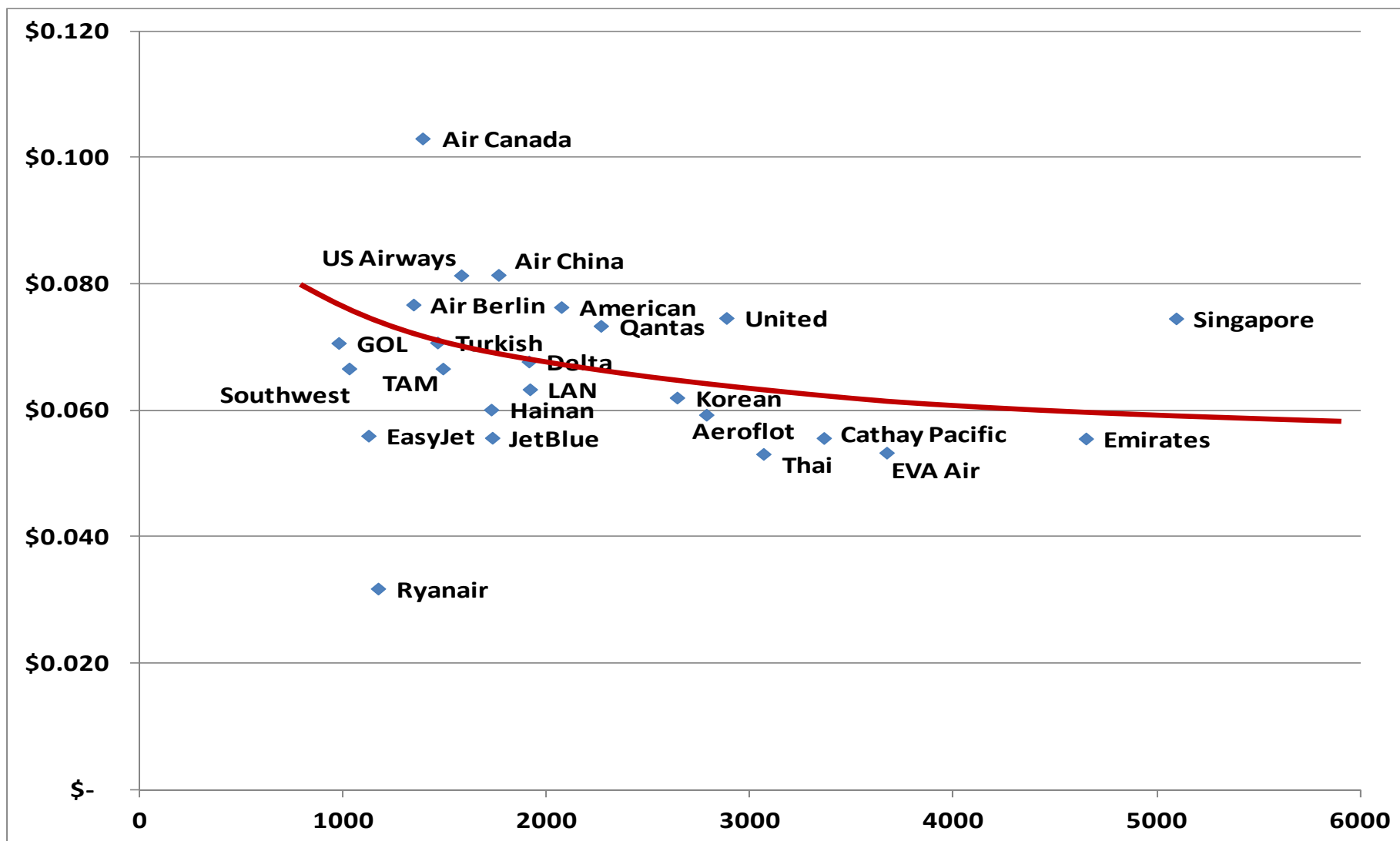


## ***Impacts of Stage Length on Unit Costs***

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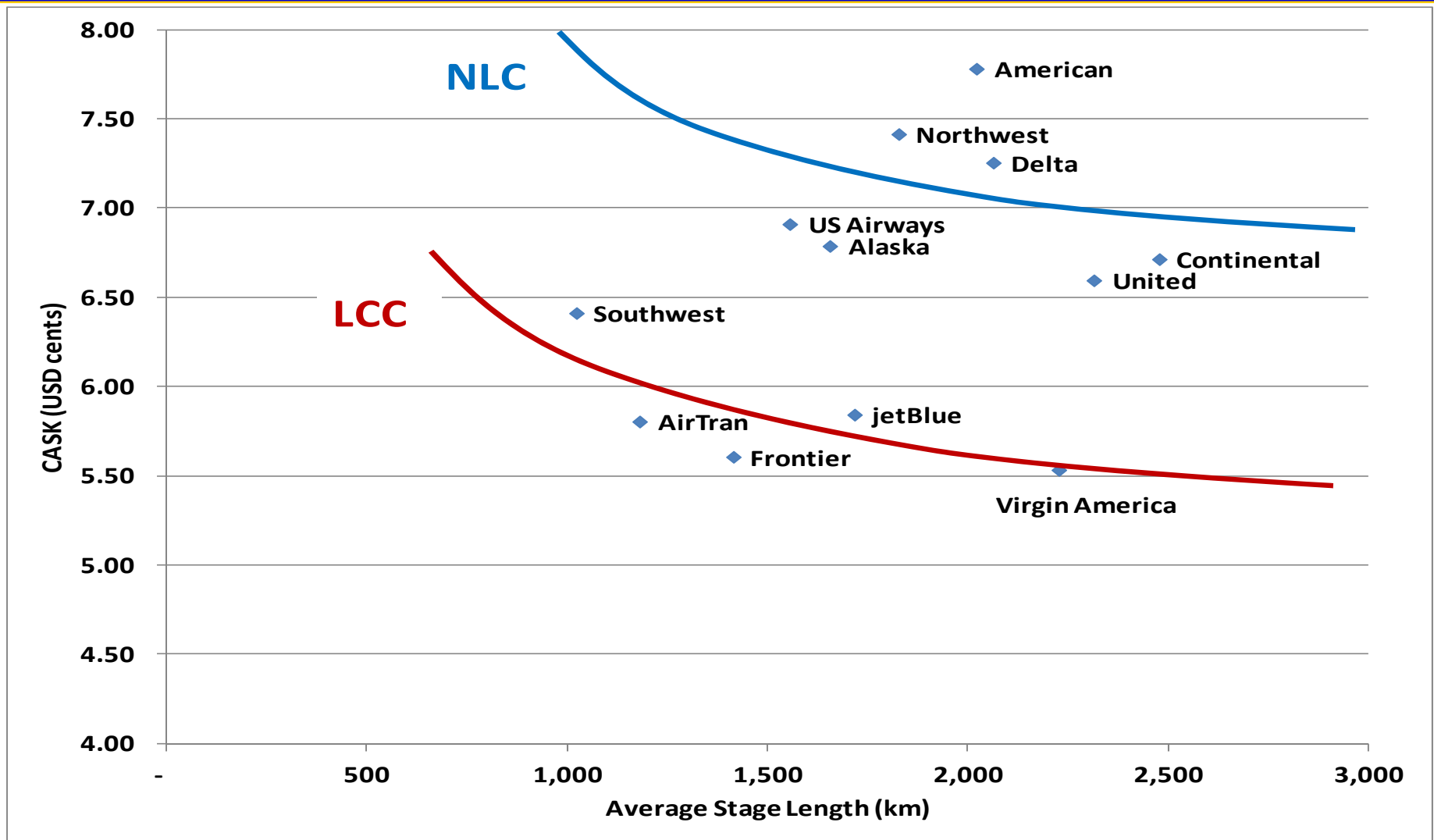
- **Industry unit cost curve is downward sloping with respect to the average stage length.**
- **A large proportion of the overall cost base is fixed, at least in the short-term**
  - Ownership costs, maintenance and ground infrastructure, reservations/sales and overhead
- **Contributing factors: With longer stage lengths**
  - All fixed costs can be spread over more ASMs
  - Shorter turn times relative to block times allow greater aircraft and crew utilization
  - Average block speed increases and fuel burn decreases with more time spent at cruise altitude
  - Cycle-related maintenance requirements are reduced

## 2010 Unit Cost (Operating Expense per ASK)



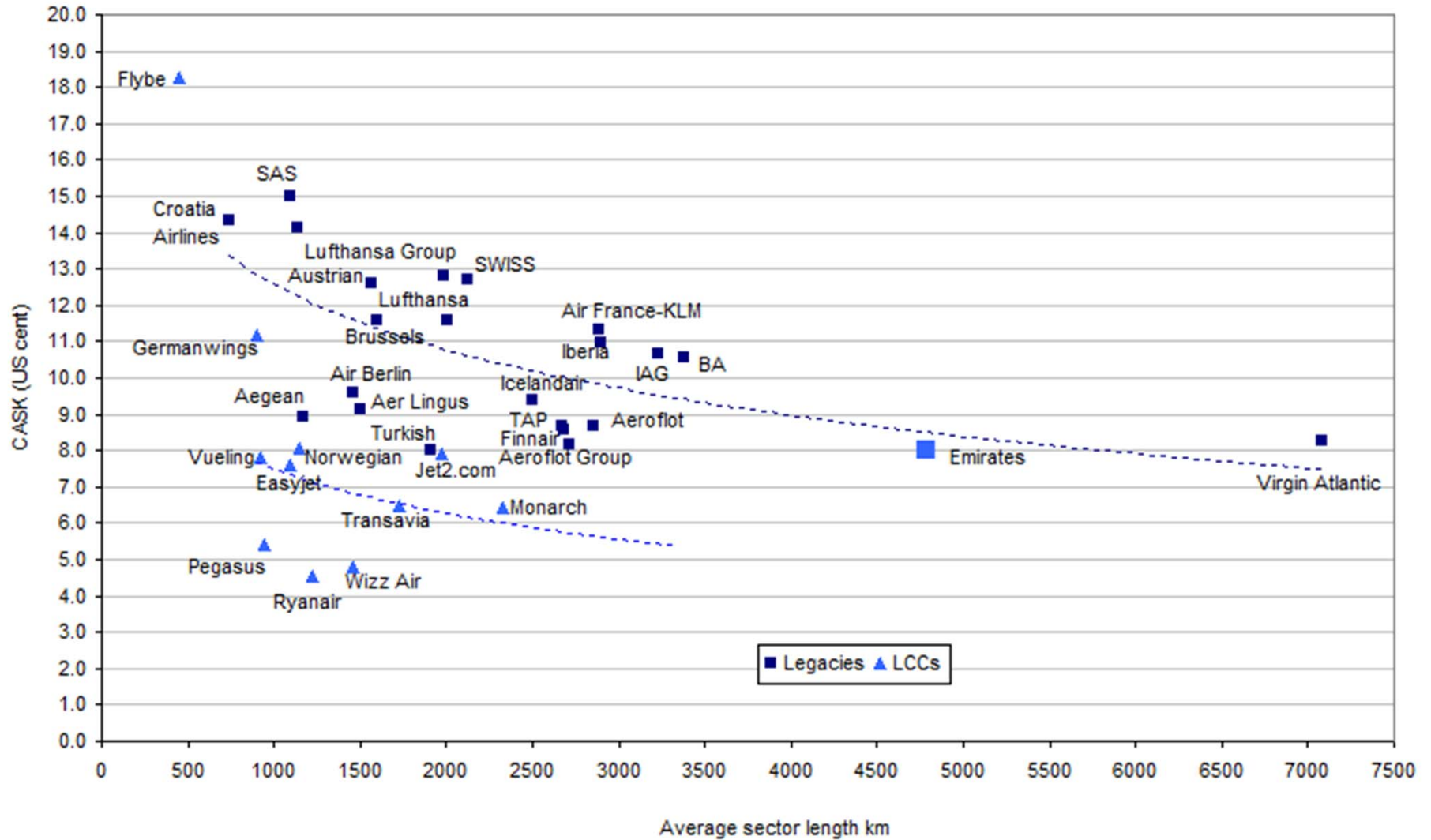
Source: Airline Business Database 2011

# 2010 Unit Cost (CASK) US NLC vs. LCC



Source: MIT Airline Data Project

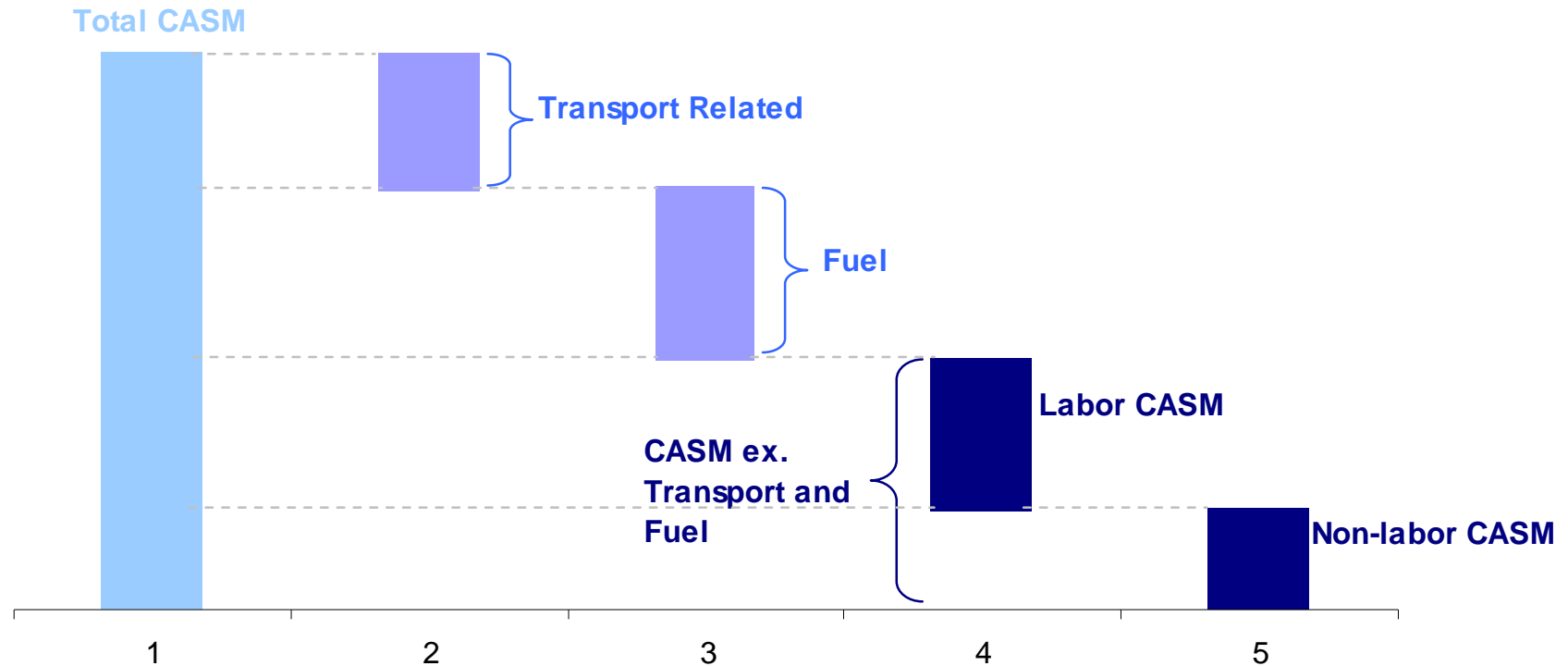
## 2012 Unit Cost (CASK) Selected Non-US Airlines



Source: Emirates Open Sky 2/14 , CAPA Data

# CASM Breakdown

- **CASM can be broken down as follows:**
  - Transport Related expenses excluded for comparisons



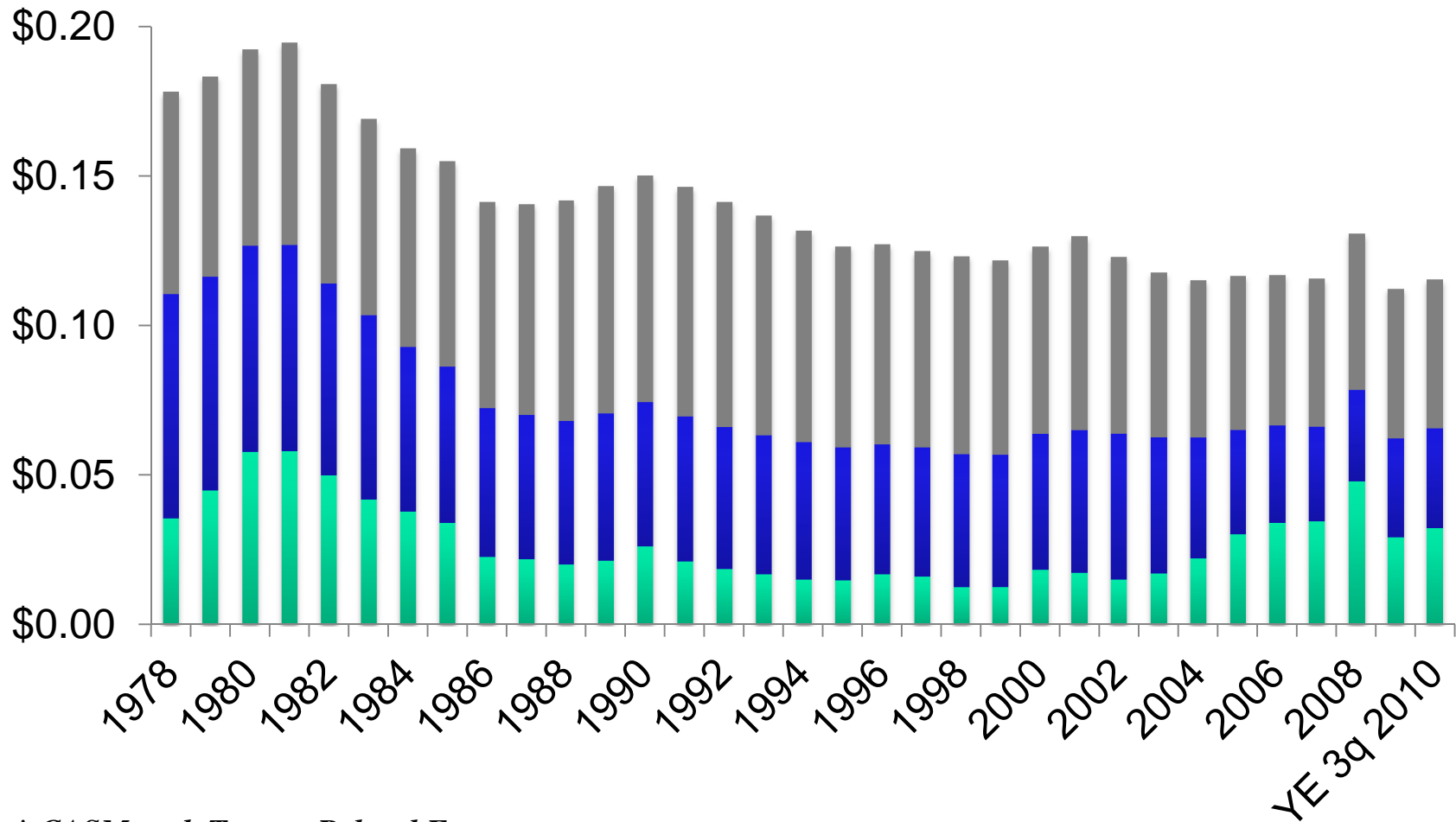
## ***Fuel, Labor and Non-Labor Costs***

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- **Compare macro trends over time and across airlines**
- **Fuel Costs have been increasing to over 30%**
  - Most “variable cost”, typically driven by global oil prices and factors outside of airline control
- **Labor Costs have been decreasing in share**
  - With greater emphasis on cost re-structuring and increasing labor productivity
  - Significant cost advantages for newer airlines and LCCs
- **Non-labor Costs represent structural differences**
  - In networks, product mix and operations

# US Airlines: Inflation Adjusted CASM\*

## Down 35% Since 1978

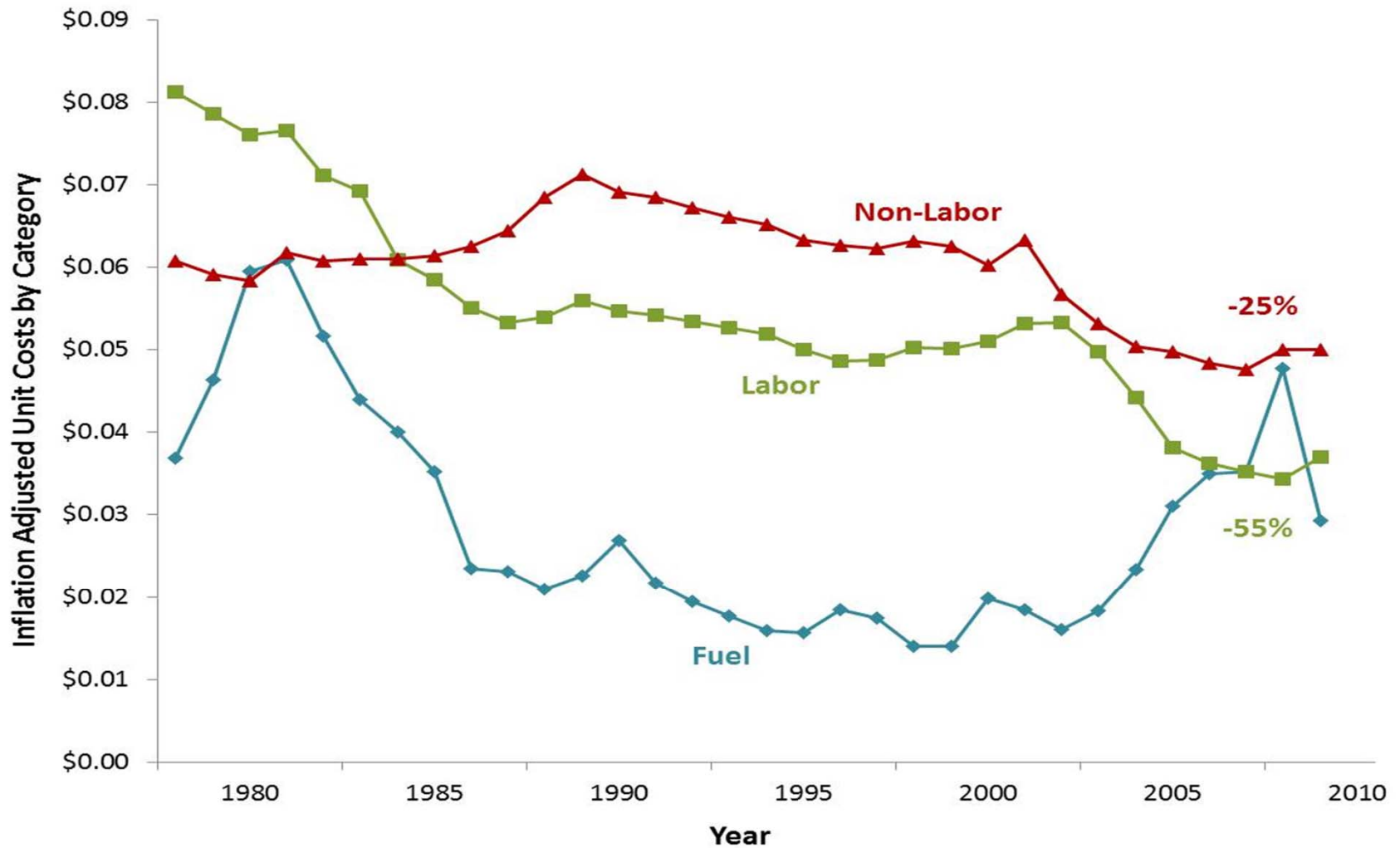


\* CASM excl. Transp. Related Expenses

■ Fuel   
 ■ Labor   
 ■ Non-Labor

Source: MIT US Airline Productivity Study, 2011

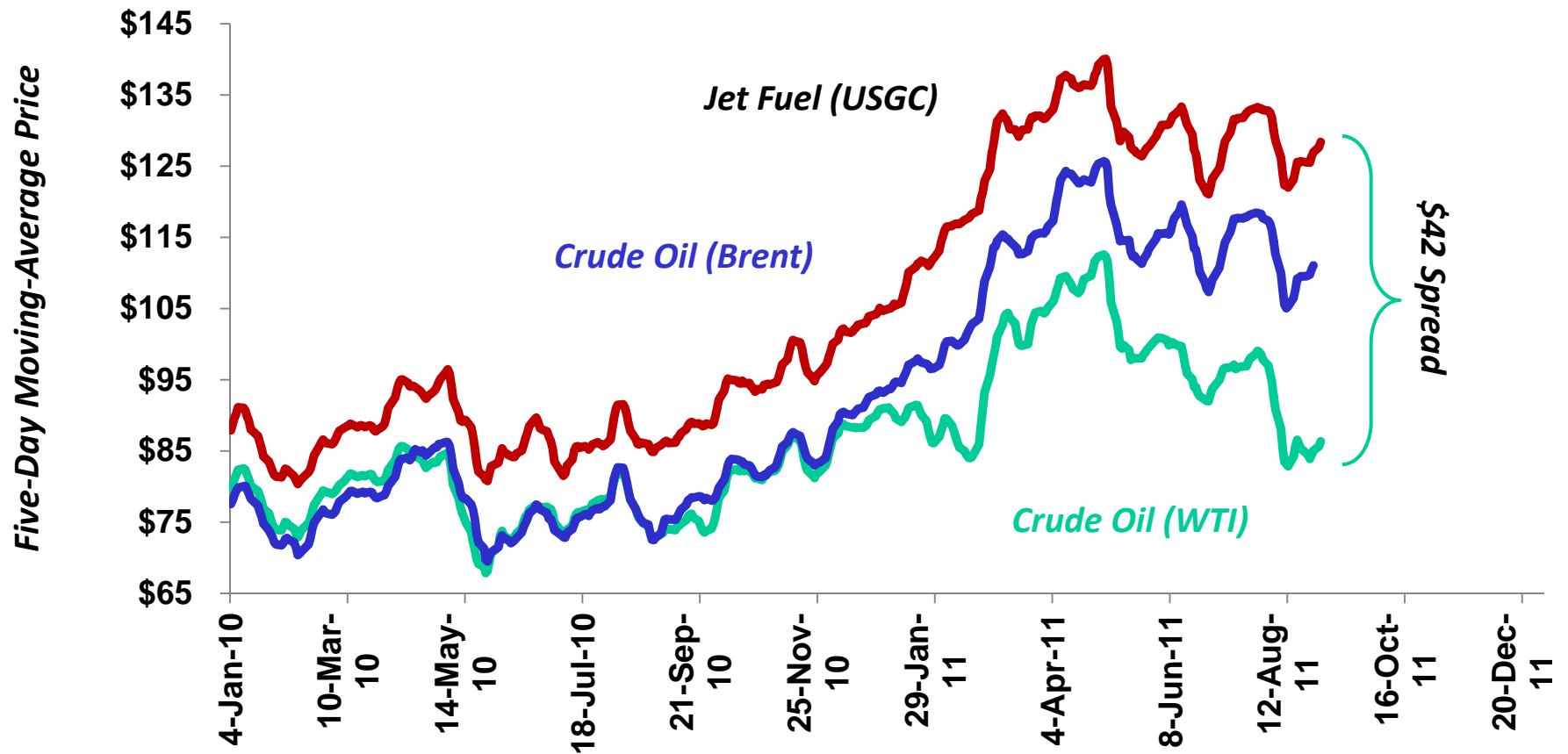
## ***Inflation Adjusted Unit Costs – Fuel, Labor, Non-Labor***



Source: MIT US Airline Productivity Study, 2011



# Jet Fuel Price Volatility



\* Refining margin (difference between jet fuel and crude oil price)

Source: ATA and EIA (for WTI and Brent crude oil and U.S. Gulf Coast jet fuel)

## ***Concluding Thoughts***

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- **Legacy carriers made dramatic progress in cost cutting and productivity improvement 2001-2007**
  - Labor and distribution costs saw biggest reductions
  - Productivity improvements through network shifts, work rules and use of IT for passenger processing
- **Not much room for further cost reductions**
  - Labor will push to recover wage and benefit concessions
  - Distribution costs can't go much lower
  - Aging fleets will push up maintenance costs
- **Recent return to industry profitability has relied heavily on demand growth and revenue generation**
  - Capacity discipline – higher yields and higher load factors